

# **Exhibit 31**


[Blog](#) [Latest Stories](#) [Product News](#) [Topics](#)


GOOGLE MAPS PLATFORM

# New JavaScript Street View renderer brings rendering improvements and better mobile support

Elena Kelareva  
Product Manager, Google  
Maps APIs

August 17, 2016

Street View is one of Google Maps' most loved features, providing users with a way to explore and experience the world around them. Developers all over the world use Street View in the Google Maps JavaScript API to make their apps more unique and exciting, giving their users a sense of what it's like to visit a place in real life.

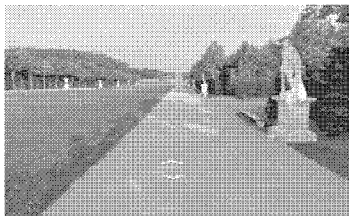
Today we're making Street View even better, especially on mobile devices, by launching a new Street View renderer in the Google Maps JavaScript API. Read on for the full details of what we've improved!

## Better display

### Smoother Transitions

Transitions from one point to another in Street View now include more animation frames, creating the effect of gliding smoothly to the next location. Transitions in the old renderer looked like jumping from one location to another.

#### Old renderer

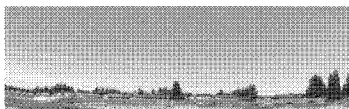


#### New renderer



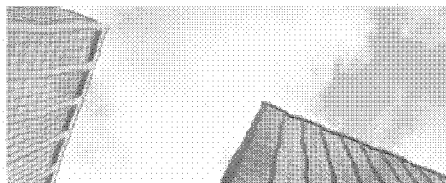
The old renderer repeats images while loading new content, resulting in a stuttering effect. The new renderer uses lower resolution imagery while loading, resulting in a smoother animation when rotating an image in Street View.

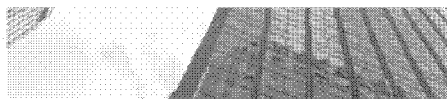
#### Old renderer



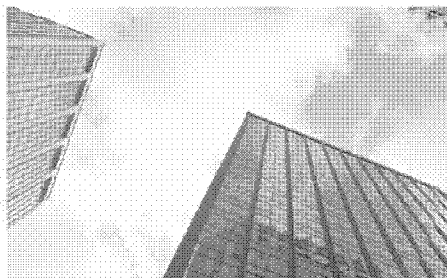
wavy lines in the old renderer, as opposed to crisp lines in the new renderer.

#### Old renderer



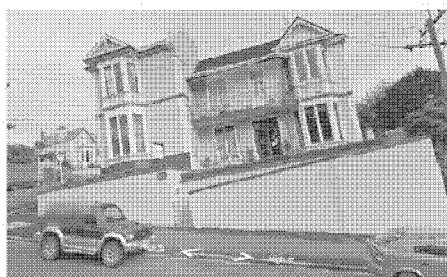


New renderer

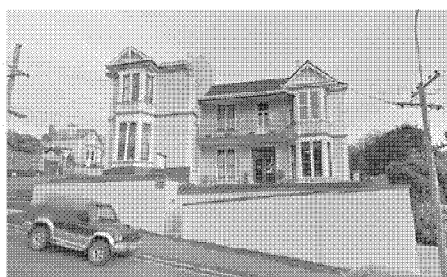


In another example: for imagery on an incline, such as a street with a steep hill, the new renderer corrects the objects to be vertical, whereas the old renderer would have shown the objects at an angle.

Old renderer



New renderer



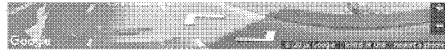
## Better mobile support

### WebGL imagery

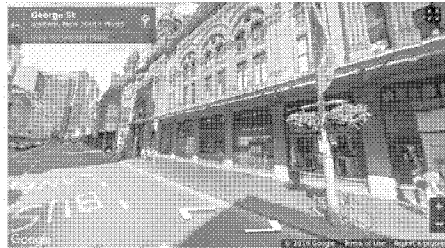
The new renderer uses WebGL (on browsers that support it) which results in a higher frame rate and better rendering, especially on mobile devices. On mobile devices, the old renderer would display a fish-eye projection of the image, whereas WebGL allows us to present a rendered sphere that looks as it would in reality. For example, the street in the image below is straight, but the old renderer made it look curved on mobile devices.

Old renderer





#### New renderer



#### Touch support

As mobile web usage grows, users expect familiar touch-based interactions to work everywhere. The new renderer supports the same natural touch-based gestures on mobile, which have been available in the Google Maps Android app: pinch-to-zoom and double-tap-to-go. In the old renderer, zooming was only available through the +/- buttons, and movement was only possible by clicking the arrows on the ground.

#### Motion tracking on mobile devices

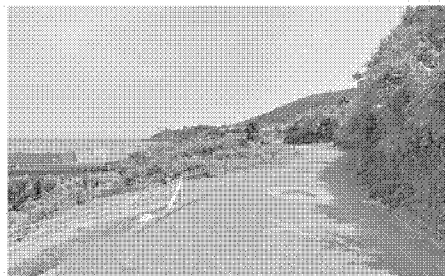
Mobile devices give developers the opportunity to provide their users with more natural ways to explore and interact with their applications. We've enabled support for device orientation events on Street View so that users on mobile devices can look around in Street View by moving their phone. Developers have the option to turn this off if they prefer. Please see the developer documentation for more details, or open the documentation link on a mobile device to see motion tracking in action.

#### Better controls

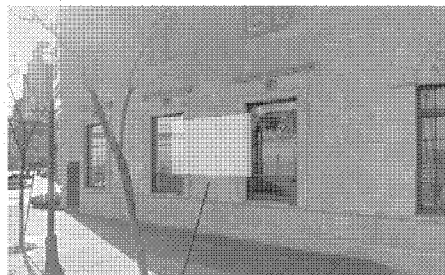
##### X Forward

When using a desktop device with a mouse or trackpad, users will see a small "X" at the cursor location that indicates the next camera location if they choose to move forward. Arrows indicate the direction of movement. Wall rectangles identify the direction the camera will point towards.

##### Next image targets



##### Next centered image target



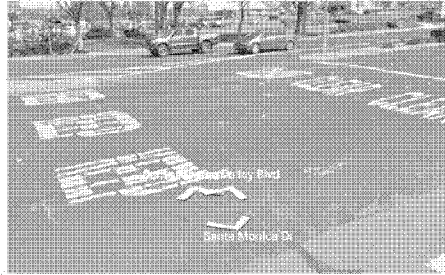
##### Cleaner street names, labels and targets

Street names and labels are now separated from controls, removing overlap issues and

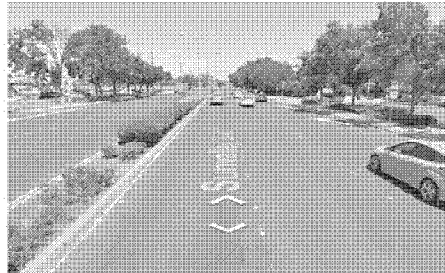


allowing for clean display in right-to-left and left-to-right languages.

Old renderer



New renderer



We hope you enjoy using the new and improved Street View renderer! Also a big thank you to all the developers who use the Google Maps JavaScript API and provide feedback via the [issue tracker](#). Getting feedback from developers is vital for us to be able to keep improving our products, so if you have any bug reports or feature requests, please let us know!

For more information on Street View in the Google Maps JavaScript API, please see the [developer documentation](#).



POSTED IN: [GOOGLE MAPS PLATFORM](#)



[+ SHOW RELATED ARTICLES](#)